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## ABSTRACT

A study of 39 elementary schools in Chicago was conducted to compare two sets of schools, those whose students made above average yearly gains in reading comprehension and those whose students' reading gains were below average. These schools were compared on the proportion of time spent on task, on what the teacher and pupils did during reading instruction, and the rated qualities of the teachers and pupils on subjective measures. The sets of schools did not differ on class size, staffing costs, number of non-English speaking students, experience or education level of teachers, percent of minority pupils, retention rate, reading appropriations, assaults, vandalism, security costs, or suspensions. The proportion of time that reading was the teacher's main task differed significantly and the teachers in high gain schools were rated by observers to have better organized lessons and to be better managers of time. (The classroom observation form used in the study is included.) (TJ)

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Procedures and Use of Time  
in Reading Classes in High-Gain and Low-Gain  
Elementary Schools in Chicago

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Abstract

The results of an earlier regression study (Fredrick, et al., 1978a) showed that there was a substantial amount of variation in reading scores which could not be explained by school characteristics. The possibility of finding additional correlates to gains in achievement was pursued by observing classrooms in 39 schools.

A major new finding was the analysis of how instructional time can become lost and how the extent of this loss is predictive of achievement gains at the school. Further analyses using covariance showed that high-gain schools put priority on reading instruction, they had better organized lessons and managed time better than the low-gain schools.

Board of Education, City of Chicago

Department of Research & Evaluation  
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Time is a precious commodity that is easily dissipated in the classroom. Fredrick (1977) has shown that as much as 50% of the available student minutes of instruction can be lost in Chicago high schools, mainly due to absent students, uninvolved students, and interruptions to the lesson. The loss of time was greater in those high schools where reading scores were below the Chicago high school mean than in those above it (49% versus 25%). A recent review (Fredrick & Walberg, 1978) showed that amount of instructional time was, in general, positively related to level of achievement.

The current study applied the procedures used in the high school study to Chicago public elementary schools. The purpose of this study was to compare two sets of elementary schools, those that made above average yearly gains in reading comprehension and those whose reading gains were below average. These schools were compared on the proportion of time spent on task, on what the teacher and pupils did during reading instruction, and the rated qualities of the teachers and pupils on subjective measures.

#### Procedure

Public elementary schools in Chicago (n=39) were selected using an unbiased procedure. Two classrooms, one each in grades three and six, were randomly selected within each school as the observation sites. Principals and teachers were told that observers were being sent to see how reading was typically taught. Four observers were trained and paid and had previously demonstrated an inter-rater reliability of between .86 and 1.00 in coding the variables of interest.<sup>1</sup> Observations were made during the period from May 23 through June 7, 1978. Five schools in the

<sup>1</sup>See "Reliability Study: Classroom Observation Form," Cyclical Evaluation Team, Department of Research & Evaluation, 1978

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sample were only observed once, either because reading classes at one level were no longer meeting at the end of the school year (3 cases), or because of missed observations (2 cases). Two classes were observed in each of the other 34 schools.

The variables observed were those which appear on the Classroom Observation Form, a copy of which appears as Appendix A. Ten of the variables were used to tabulate the proportion of time on task. These variables were combined to arrive at the total instructional minutes in reading (time scheduled for reading x pupils assigned to the class), with deductions for absent pupils, time not used for reading instruction, and losses due to poor transitions, uninvolved pupils, interruptions, and in-and-out movements by pupils.

#### General Results

The variables related to the computation of time and their mean values for the set of schools were as follows:

|                                                                                   |        |
|-----------------------------------------------------------------------------------|--------|
| A. Number of pupils assigned to the classroom                                     | 28.36  |
| B. Number of minutes scheduled for the day's reading                              | 59.80  |
| C. Minutes of reading instruction actually provided                               | 58.49  |
| D. Pupils physically present in the room, counted every five minutes and averaged | 24.84  |
| E. Pupils not involved, counted every five minutes and averaged                   | 3.06   |
| F. Pupils not working on reading, counted every five minutes and averaged         | .90    |
| G. Number of interruptions lasting one minute or more                             | .89    |
| H. Number of in-and-out movements by pupils                                       | 6.36   |
| I. Number of transitions that used up one minute or more                          | 1.81   |
| J. Teacher instructing reading as a proportion of total time provided             | 96.38% |

The total pupil-minutes scheduled for reading instruction were 1695.9, and of this quantity, 210.5 pupil minutes (12.4%) were lost when pupils were not present in the room, 175.8 minutes (10.4%) were lost to pupils not involved, 26.9 minutes (1.6%) were lost due to pupils working on something other than reading, 22.1 minutes (1.3%) were lost to interruptions, 27.4 minutes (1.6%) were lost when reading time was shortened, 23.0 minutes (1.4%) were lost to in-and-out movements by pupils, 39.3 minutes (2.3%) were lost in long transitions from one activity to another, and finally, 30.7 minutes (1.8%) were lost to nonacademic tasks that the teacher introduced into the reading lesson. In total, 555.7 pupil-minutes were poorly used, leaving 1140.2 minutes, or 67.3% of the time, well used. When all 39 schools were included, the correlation between time-on-task and 1975-77 yearly gain in reading was .45 (significant at .01 for 37 df). When only the 34 schools were included for which a complete observation was available, the  $r$  was .50 (significant at .01 for 32 df). When 1978 gains were combined with the gains over the prior 2 years, the correlation between time-on-task and gains was .53 (significant at .01 level for 32 df; the five single observation schools were not included). When time-on-task was correlated with the 1978 gains alone, the  $r$  was .28 (narrowly missing significance at the .10 level for 32 df). This decline in correlation for the 1978 scores used alone shows the variable nature of gains during a single year. In the same way, one classroom does not represent the school nearly as well as two, even though random sampling occurred in selecting the particular classes.

Time-on-task correlated  $-.34$  with the 1978 poverty index for the community in which the school was located ( $p < .05$  for 32 df). More

instructional time is lost in schools in poorer communities. Time-on-task correlated with age 10 achievement scores .44, showing that schools with higher achievement make better use of classroom time.

#### High Gain vs. Low Gain

This study enabled us to test whether more time on task is actually associated with gains in reading. The evidence suggests that it is.

Following up on the significant correlations between time and gain, the set of schools was divided into two sets, those with gains above the citywide average of 7.0 months per year and those with gains less than or equal to 7.0 months. The high gain set included 22 of the observed schools, the low gain set had 17. Differences between these two were very interesting.

Using all the observations for each set, the high gain set showed a mean percentage of time-on-task of 71.7, the low gain set had a mean percentage of 60.9. The difference of 10.8 was significant ( $t = 3.28$ ,  $p < .01$ ,  $df = 37$ ). When only the 34 schools which had two observations were included (20 and 14 schools for the high gain and low gain set, respectively) the mean percentages were 71.4 and 61.3 for high gain and low gain schools, respectively ( $t = 4.91$ ,  $p < .01$ ,  $df = 32$ ). The standard deviations were 7.8 and 7.4 respectively, for the two sets.

Since poverty correlated significantly with time-on-task it was possible that this variable was the underlying basis for the relationship between time and reading gains. The low gain set of schools did in fact have a higher poverty level than the high gain set, 37.2% vs. 16.4% ( $t = 3.2$ ,  $p < .01$ ,  $df = 37$ ). By deleting the 4 highest poverty schools from the low gain set and the 9 lowest poverty schools from the high set,

the remaining sets of 13 schools each were roughly equal in poverty levels (27% poverty for the low gain set and 26% for the high gain set). The difference between the two sets (thus informally equated for poverty) on the variable, time-on-task, was still significant. The truncated low gain set averaged 59.3% time-on-task while the truncated high set averaged 70.5% time-on-task ( $t = 2.96$ ,  $p < .01$ ,  $df = 24$ ). To properly control for poverty and achievement, the dependent variables were tested by analysis of covariance (see section below).

The high and low gain schools were compared on other variables besides poverty. These analyses showed that the two sets of schools did not differ significantly on class size, staffing costs, number of non-English-speaking pupils, experience level of teachers, education level of teachers, number of special programs, change in enrollment, size of school, percent minority pupils, retention rate, reading appropriations, assaults, vandalism, security costs or suspensions.

They did differ significantly on proportion of White teachers (70.3% for high gain schools vs 49.2% for low), attendance (92.0% vs. 90.0%), average number of students per grade (60.2 vs. 82.1), age seven ITBS reading comprehension scores (3.1 vs. 2.7), age ten ITBS scores (5.2 vs. 4.3), age thirteen ITBS scores (7.8 vs. 6.2), mobility rate of students (21.9% vs. 31.2%), percent of pupils one year behind in the Chicago reading curriculum (26.0% vs. 55.9%), percent of pupils two years behind (11.0% vs. 30.8%), and reading index (7.3 vs. -1.7), a measure of whether the school is above or below the median school in the city.

By using percent poverty as a covariate, the differences between the two sets of schools were reduced to only these: reading achievement gain at primary level (adjusted scores: high set, 7 months; low set, 5.4

months), reading achievement gain at upper level (10.3 vs. 6.41), percent of pupils one year behind (28.7% vs. 52.5%), percent of pupils two years behind (12.1% vs. 29.4%), and reading index (6.31 vs. -.36). All these variables stem directly from the differences in gains. None of the other variables that related to community effects, school size, or teacher variables was significant. This indicates that the covariance adjustment to the data would be a satisfactory test of the observation data.

Since achievement level differed between the two sets of schools, it too was used as a covariate to test for differences, apart from the linear affect of achievement. The correlation between median school achievement at age 10 and the time-on-task within each school was .44. When this linear effect was removed from the correlation between mean gain and time-on-task (originally  $r = .53$ ) the resulting partial  $r$  was .46, which was still significant. This suggests that while time-on-task is partly a response to level of achievement it is still strongly associated with reading gains independent of particular achievement level. The analyses of covariance of the other dependent measures (see Table 1) are discussed later after other results are presented from the analysis of the teacher and pupil measures.

#### Teacher and Pupil Measures

The set of schools with yearly gains that were higher than the city-wide mean had larger class size than those below the citywide mean (see Table 1). The minutes scheduled for reading did not differ between the two sets of schools, but more pupils were present in the high-gain schools. The high-gain schools showed fewer, but not significantly fewer, pupils not involved, fewer pupils not reading; and fewer, but not significantly fewer, classroom interruptions. The high-gain had fewer, but not

Table 1: Comparison of Observation Results from High-Gain and Low-Gain Schools

| Table 1: Comparison of Observation Results from High-Gain and Low-Gain Schools |           |      |          |      |                 |             | p level                                | p level                                    |
|--------------------------------------------------------------------------------|-----------|------|----------|------|-----------------|-------------|----------------------------------------|--------------------------------------------|
| Variable                                                                       | High Gain |      | Low Gain |      | t-test<br>value | p*<br>level | p level                                | p level                                    |
|                                                                                | Mean      | S.D. | Mean     | S.D. |                 |             | with<br>poverty<br>as the<br>covariate | with<br>achievement<br>as the<br>covariate |
| Minutes Scheduled for the Reading Period                                       | 58.7      | 20.0 | 61.3     | 16.4 | .59             | --          | --                                     | --                                         |
| Number of Pupils that were:                                                    |           |      |          |      |                 |             |                                        |                                            |
| Assigned to the Classroom                                                      | 29.2      | 2.9  | 27.2     | 4.7  | 2.14            | .037        | .039                                   | .014                                       |
| Present During the Observation                                                 | 25.9      | 3.3  | 23.4     | 5.2  | 2.35            | .023        | .033                                   | .020                                       |
| Not Involved                                                                   | 2.8       | 1.6  | 3.5      | 2.2  | 1.49            | .141        | --                                     | --                                         |
| Not Reading                                                                    | .5        | 1.2  | 1.5      | 2.1  | 2.35            | .023        | .077                                   | .061                                       |
| Going In and Out                                                               | 5.8       | 7.7  | 7.0      | 6.1  | .73             | --          | --                                     | --                                         |
| Number of Interruptions of the Lesson                                          | .7        | 1.1  | 1.2      | 1.4  | 1.61            | .111        | --                                     | --                                         |
| Number of Transitions Longer than 1 Min.                                       | 1.81      | 1.5  | 1.84     | 1.3  | .07             | --          | --                                     | --                                         |
| Percent of Time Reading is the Main Task                                       | 97.7      | 2.9  | 94.6     | 8.0  | 2.06            | .046        | .084                                   | .147                                       |
| Percent of Time Teacher is Oriented to:                                        |           |      |          |      |                 |             |                                        |                                            |
| the Whole Class                                                                | 44.3      | 41.9 | 42.6     | 36.7 | .18             | --          | --                                     | --                                         |
| a Small Group                                                                  | 52.9      | 40.6 | 53.9     | 36.1 | .11             | --          | --                                     | --                                         |
| Individuals                                                                    | 3.8       | 7.7  | 6.6      | 17.6 | .83             | --          | --                                     | --                                         |
| Percent of Time that the Teacher:                                              |           |      |          |      |                 |             |                                        |                                            |
| Presents Lessons                                                               | 28.0      | 23.6 | 39.3     | 27.5 | 1.89            | .063        | .098                                   | .157                                       |
| Teaches Guided Reading                                                         | 56.4      | 32.2 | 42.8     | 27.1 | 1.92            | .059        | --                                     | --                                         |
| Supervises Seatwork                                                            | 17.7      | 22.8 | 21.6     | 22.7 | .72             | --          | --                                     | --                                         |
| Gives Tests                                                                    | 3.0       | 7.0  | 2.7      | 11.2 | .15             | --          | --                                     | --                                         |
| Disciplines Pupils                                                             | 2.4       | 5.7  | 4.9      | 9.4  | 1.32            | .193        | .163                                   | --                                         |
| Does Deskwork                                                                  | 8.6       | 14.8 | 7.0      | 10.5 | .52             | --          | --                                     | --                                         |
| Does Other Activities                                                          | 8.1       | 9.1  | 15.9     | 25.7 | 1.62            | .115        | --                                     | --                                         |
| Percent of Time that the Pupil:                                                |           |      |          |      |                 |             |                                        |                                            |
| Reads Silently                                                                 | 30.5      | 35.9 | 28.2     | 30.5 | .29             | --          | --                                     | --                                         |
| Has Guided Reading                                                             | 57.6      | 32.1 | 50.7     | 28.1 | .96             | --          | --                                     | --                                         |
| Does Exercises and Worksheets                                                  | 63.5      | 37.5 | 63.8     | 35.2 | .04             | --          | --                                     | --                                         |
| Does Writing                                                                   | 2.3       | 15.1 | 4.3      | 18.2 | .52             | --          | --                                     | --                                         |
| Listens to Teacher                                                             | 23.9      | 24.3 | 27.9     | 25.7 | .69             | --          | --                                     | --                                         |
| Has Recitation                                                                 | 5.5       | 10.8 | 8.3      | 15.1 | .91             | --          | --                                     | --                                         |

\*Probability levels of .200 or less are shown. Those variables with a p level less than .100 can be considered to show statistically significant differences between the High and Low Gain schools.

Table 1: (Continued)

| Table 1: (Continued)                  |           |       |          |       |                 |            | p level<br>with<br>poverty<br>as the<br>covariate | p level<br>with<br>achievement<br>as the<br>covariate |
|---------------------------------------|-----------|-------|----------|-------|-----------------|------------|---------------------------------------------------|-------------------------------------------------------|
| Variable                              | High Gain |       | Low Gain |       | t-test<br>value | p<br>level |                                                   |                                                       |
|                                       | Mean      | S.D.  | Mean     | S.D.  |                 |            |                                                   |                                                       |
| Ratings of Pupil Qualities (2 - 8):   |           |       |          |       |                 |            |                                                   |                                                       |
| Energy Level of Group (Low - High)    | 6.2       | 1.4   | 6.7      | 1.2   | 1.80            | .076       | --                                                | --                                                    |
| Behavior (Disruptive - Responsible)   | 6.7       | 1.1   | 6.0      | 1.8   | 2.01            | .050       | .132                                              | --                                                    |
| Movement (Unrestricted - Restricted)  | 5.2       | 1.6   | 5.6      | 1.9   | .78             | --         | --                                                | --                                                    |
| Work Attitude (Negative - Positive)   | 6.3       | 1.1   | 5.9      | 1.8   | 1.19            | --         | --                                                | --                                                    |
| Ratings of Teacher Qualities (2 - 8): |           |       |          |       |                 |            |                                                   |                                                       |
| Clarity of Presentation (Low - High)  | 6.7       | 1.0   | 6.2      | 1.9   | 1.39            | --         | --                                                | --                                                    |
| Lesson Organization (Poor - Good)     | 6.9       | 1.1   | 6.3      | 1.6   | 1.74            | .089       | .086                                              | .040                                                  |
| Management of Time (Poor - Good)      | 6.8       | 1.1   | 6.1      | 1.5   | 1.96            | .054       | .064                                              | .019                                                  |
| Work Expectation (Low - High)         | 6.4       | 1.2   | 6.1      | 1.7   | .74             | --         | --                                                | --                                                    |
| Enforcement of Rules (Lax - Strict)   | 6.2       | 1.6   | 6.1      | 1.7   | .31             | --         | --                                                | --                                                    |
| Contact with Individuals (Low - High) | 6.3       | 1.5   | 6.1      | 1.5   | .58             | --         | --                                                | --                                                    |
| Feedback to Students (Sparse - Ample) | 6.2       | 1.3   | 6.0      | 1.6   | .82             | --         | --                                                | --                                                    |
| Ratings of Overall Qualities (1 - 6): |           |       |          |       |                 |            |                                                   |                                                       |
| Teaching Method (Ordinary - Original) | 3.0       | 1.4   | 3.1      | 1.6   | .33             | --         | --                                                | --                                                    |
| Class Climate (Rejecting - Accepting) | 4.7       | 1.0   | 4.4      | 1.4   | 1.05            | --         | --                                                | --                                                    |
| Concern for Material (Low - High)     | 4.7       | 1.1   | 4.2      | 1.3   | 1.66            | .101       | --                                                | --                                                    |
| Quality of Environment (Low - High)   | 4.7       | 1.2   | 4.4      | 1.3   | 1.17            | --         | --                                                | --                                                    |
| Variety of Material (Low - High)      | 4.2       | 1.3   | 4.2      | 1.4   | .17             | --         | --                                                | --                                                    |
| Minutes Lost Due to Absences          | 206.1     | 198.9 | 236.5    | 145.1 | .72             | --         | --                                                | --                                                    |
| Minutes Lost Through Not Reading      | 28.1      | 63.9  | 87.9     | 133.8 | 2.31            | .026       | .108                                              | .083                                                  |
| Minutes Lost Through Non-Involvement  | 161.6     | 110.0 | 197.4    | 141.4 | 1.23            | --         | --                                                | --                                                    |
| Minutes Lost Due to Interruptions     | 17.3      | 27.4  | 25.6     | 33.1  | 1.54            | .130       | --                                                | --                                                    |
| Minutes Lost to Going In-and-Out      | 89.3      | 33.4  | 93.8     | 23.8  | .76             | --         | --                                                | .117                                                  |
| Minutes Lost Due to Long Transitions  | 47.8      | 38.4  | 42.6     | 30.9  | .62             | --         | --                                                | .058                                                  |
| Proportion of Pupils Who are On-Task  | .89       | .06   | .84      | .11   | 2.28            | .028       | .158                                              | .121                                                  |
| Proportion of Time on Task            | .73       | .08   | .63      | .07   | 3.28            | .010       | .036                                              | .042                                                  |

significantly fewer, pupil movements in-and-out of the classroom and fewer long transitions. However, the proportion of time that reading was the teacher's main task was significantly higher in the high gain schools. In the overall measure of time-on-task, the difference in the proportions was highly significant, indicating that the level of gains in reading is associated with the observed level of productive usage of time.

Teacher behavior in terms of the proportion of attention given to the whole class, to groups, and to individuals did not differentiate the schools that made higher than average yearly gains in reading from those that made lower gains. Whole class orientation was seen during 43.4% of the five-minute observer sweeps of a classroom, group orientation during 53.4% of the observations, and individual orientation during 5.2%. These total more than 100% because more than one type of orientation could be evident during a sweep.

In low-gain schools, teachers spent greater proportions of time presenting lessons than did the teachers in the high-gain schools (see Table 1), and smaller proportions on guided reading, but proportions of time spent on supervising seatwork, testing, doing deskwork, disciplining, and other tasks did not differ between the two sets of schools.

The observers rated the teachers in the high-gain schools to have better organized lessons than those in the low-gain schools, and as better managers of time. The teachers in the two sets of schools were not rated differently on clarity of presentation, work expectation, enforcement of rules, level of contact with individual pupils, or feedback to students.

Most pupil activities were not statistically different between the low and high-gain schools. These included the proportions of time spent on silent reading, guided reading, exercises-worksheets, writing, listening to teacher, and recitation.

However, the observers rated the pupils in the low-gain schools as having marginally higher energy levels than those in the high-gain schools, and as having poorer behavior. The ratings for pupils' attitudes toward the work, and pupil freedom of movement did not differ significantly between the two groups.

None of the general measures; originality of teaching method, climate of acceptance, concern shown for material, variety of material, and conduciveness of the physical environment toward learning, differed significantly in comparing the low and high-gain sets.

#### Analysis of Covariance

All the observation variables were tested for significance using, first, poverty as the covariate, and then, achievement level as the covariate. The results are shown in Table 1 in the last two columns. In general the differences between the high and low-gain schools were reduced when the linear effect of poverty was removed from the scores through the covariance adjustment. Nevertheless, the high-gain schools still showed a higher percent of time that reading was the main task, the lesson organization and management of time was rated as better and most importantly, the proportion of time-on-task was higher in the high-gain than in the low-gain schools. These same differences also appeared when achievement was the covariate.

## Summary and Conclusions

Elementary schools do differ in how well they use the class time that is scheduled for reading instruction. The schools which have higher growth in reading comprehension scores also show a better use of time and a more effective environment. Specifically, the differences are seen in behavior level, organization of lesson and management of time, concern for materials, and the amount of time lost through not reading, uninvolved pupils, and interruptions. All these dissipations of time combine to make a ten percentage point difference in the proportion of time spent on task. The difference holds up, even after removing the effect of poverty and initial level of achievement. So it appears that in elementary schools, better use of time coincides significantly with gains in reading scores, and that this is true for schools in either the high poverty or middle to upper income areas and in schools with highly achieving or less highly achieving pupils.

It is apparent that more concern about how time is spent in classrooms will have some benefits. This is an important variable that teachers and principals can do something about.

These results were based on observations that occurred within the scheduled time for reading instruction. If the observations were for the full day, from the starting bell to the closing bell, significantly higher proportions of time would probably be identifiable as lost to such non-academic tasks as lining up, settling down, cleaning up, waiting, starting late, finishing early, listening to announcements, and other tasks that are only superficially instructional. On the other hand, the observations were very late in the school year and it might be expected that at mid-year and other times a higher proportion of time would be well used.

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